

Remarks

Claims 1-24 are pending. Claims 1, 6-10 and 13-22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hollenbach et al. (US Patent no. 6,205,219) in view of Talambrias (US Patent no. 2,977,547) and further in view of Dayton (US Patent no. 5,095,282). Claims 2, 3, 11, 12, 23 and 24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hollenbach et al. (US Patent no. 6,205,219) in view of Talambrias (US Patent no. 2,977,547) in view of Dayton (US Patent no. 5,095,282) and further in view of Smith (US Patent no. 4,292,595). Claims 4 and 5 are objected to as being dependent upon a rejected base claim, but are indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The Applicants acknowledge with appreciation the Examiner's indication of allowable subject matter in claims 4 and 5. Applicants respectfully traverse the rejections.

The references relied upon by the Examiner do not teach or suggest the claimed combination involving transconductance devices.

The references relied upon by the Examiner each appear to teach the use of operational amplifiers. Note the use of the standard symbol for an operational amplifier used in the figures of Hollenbach et al., Talambrias, Dayton and Smith. For example, amplifier 820 in Figure 8 of Hollenbach et al is rendered using a symbol generally associated with an operational amplifier and the output of the amplifier drives feedback resistor 802, which is consistent with a voltage output. None of the references appear to utilize a symbol corresponding to a transconductance amplifier, such as the symbols used in Figure 2 of the specification as originally filed. Nor does the Examiner point to a teaching within the references for transconductance amplifiers.

There are significant differences in the characteristics of operational amplifiers and transconductance amplifiers. Operational amplifiers are typically characterized by high gain and low output impedance relating to a voltage output, which are generally considered to be desirable characteristics to one of ordinary skill in the art. An operational amplifier is, generally, a voltage controlled voltage source. Transconductance amplifiers are characterized by low gain and one or more current outputs, which have relatively high impedance. A transconductance amplifier is, generally, a voltage controlled current source.

While the references relied upon teach the use of operational amplifiers, claim 1 recites a differential transconductance amplifier, a common mode canceling transconductance amplifier, and a gyrator transconductance amplifier. The references relied upon do not appear to teach or suggest the elements of the invention as claimed.

Nor do the references relied upon appear to teach or suggest the use of transconductance amplifiers. One of ordinary skill in the art would select operational amplifiers for their high gain and low output impedance, as is taught in the references relied upon. Thus, the teaching of the use of operational amplifiers in the references relied upon actually teaches away from the claimed combination, which utilizes transconductance amplifiers having relatively low gain and high impedance current outputs.

In the improved combination recited in claim 1, multiple current outputs of the transconductance amplifiers are utilized. These current outputs are relatively simple to scale for various uses within the circuit, such as current canceling. See paragraph 35 of the specification as originally filed for further discussion. Scaling down the current output permits the use of smaller capacitors in the circuit, which saves both power and circuit area. See paragraph 42 of the specification as originally filed for further discussion. In addition, current summing nodes, as illustrated in the example of Figure 2, can be implemented without the use of resistors between the amplifier output and the current summing node. Solutions involving operational amplifiers, in contrast, involve voltage summing nodes and generally require that resistors be disposed between the low impedance voltage output of the operational amplifier and the voltage summing node. Also, transconductance amplifiers can typically be implemented using less circuit area than an operational amplifier.

Furthermore, the transconductance amplifier solution of claim 1 permits the resulting circuit to operate closer to the supply voltage levels, which permits lower supply voltages to be utilized and can result in more efficient power usage. The lower current demands of the claimed invention allow resistors to be used for isolation from the tip and ring terminals of the telephone line pair. See paragraph 55 of the specification as originally filed for further discussion.

In summary, the references relied upon do not teach or suggest the transconductance amplifier solution of the claimed invention and appear to teach away from the claimed invention.

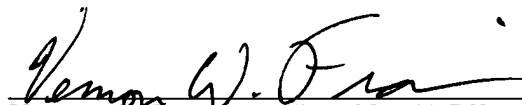
Similarly, claim 8 recites developing and generating currents in a method for interfacing to a telephone line in a manner that may be implemented utilizing transconductance amplifiers. The references relied upon appear to use operational amplifiers to produce voltages, not currents. Therefore, the references relied upon do not teach the current developing and generating steps recited in the claim. Further, the apparent use of operational amplifiers to generate voltages in the references relied upon teaches away from the currents produced in the claimed method.

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Likewise, with regard to the elements of claim 21, the corresponding structures in the specification operate by developing and generating currents in a telephone line interface device. The references relied upon appear to use operational amplifiers to produce voltages, not currents. Therefore, the references relied upon do not teach the elements recited in the claim. Further, the apparent use of operational amplifiers to generate voltages in the references relied upon teaches away from the currents produced in the claimed device.

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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